NON-PUBLIC?: N
ACCESSION #: 9103130120
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Duane Arnold Energy Center PAGE: 1 OF 03

DOCKET NUMBER: 05000331

TITLE: Reactor Scram Due to EHC Oil Fluctuations During Routine Turbine Testing
EVENT DATE: 02/09/91 LER #: 91-003-00 REPORT DATE: 03/06/91

OTHER FACILITIES INVOLVED: None DOCKET NO: 05000

OPERATING MODE: N POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: Ronald M. McGee - Technical Support Specialist TELEPHONE: (319) 851-7602

COMPONENT FAILURE DESCRIPTION:
CAUSE: SYSTEM: COMPONENT: MANUFACTURER:
REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT:

On February 9, 1991 at 1659, a reactor scram from 100% power occurred due to a sensed low control oil pressure at the Main Turbine Control valves. Extensive troubleshooting following the event identified induced electrical noise in the Turbine Electro-Hydraulic Control (EHC) System which appeared to have ultimately caused the pressure fluctuation in EHC control oil. Corrective actions include shielding of appropriate cabling and additional, more frequent EHC system component preventive maintenance. All automatic actions occurred as designed as a result of the scram. Operator actions were appropriate and expeditiously returned the plant to a stable condition.

END OF ABSTRACT

I. DESCRIPTION OF EVENT:

On February 9, 1991 at 1659 with the reactor at approximately 100% power, an automatic reactor scram occurred while performing a routine Main Turbine Overspeed trip test. A discussion of the signals that appeared to have led up to the Reactor Protection System (RPS) trip is included in the Cause of Event section.

Following the scram, reactor level lowered, due to the expected shrink, below the 170" low level setpoint, resulting in the actuation of Primary Containment Isolation Signals for PCIS Groups II through V. Reactor water level was rapidly restored to above the normal operating level as is typical during scram recovery. Upon reaching a level of 211", a main turbine trip and reactor feed pump trip occurred as designed. Level was slowly lowered and maintained within the normal band.

No other safety system actuations resulted due to the event.

II. CAUSE OF EVENT

Although a root cause for the event could not be positively recreated, the post-event review and troubleshooting efforts identified a probable sequence of events which led to the reactor scram.

Induced high frequency electrical noise signals were identified in the Main Turbine Electro-Hydraulic Control (EHC) system during troubleshooting. These signals can lead to the swapping of primary and backup Main Turbine speed error signals. This swap could result in a momentary spike that appears in the EHC logic as a large turbine overspeed condition. It is suspected that this spiking occurred during the reset portion of a routine surveillance test for the turbine overspeed circuitry and trip valves, which was the specific test step being performed when the scram occurred. The induced noise signal condition was reproduced during troubleshooting.

The Turbine Control Bypass and Intercept valves reacted appropriately to the short duration sensed overspeed condition and then returned to their original condition immediately (total bypass valve cycle time was less than 0.5 seconds).

The large, rapid demand on the EHC oil system resulted in a reduced available oil pressure at the Turbine Control Valve EHC pressure switches which are a direct input to the RPS system. This resulted in an RPS actuation and the subsequent reactor scram.

III. ANALYSIS OF EVENT

Reactor scrams are analyzed events with no adverse safety consequences. All automatic actions occurred as expected. Operator actions were appropriate and promptly restored the plant to a stable condition.

IV. CORRECTIVE ACTIONS

Extensive troubleshooting of the EHC system identified and corrected the following:

1. out of adjustment speed error signal.
2. unshielded speed error signal circuit which experienced a large induced noise fluctuation when the pressure setpoint potentiometer drive motor was energized.
3. ineffective shielding of the primary speed pickup cable.
4. sticky mechanical overspeed limit switch.

During the plant startup following the event, the speed error signal and bypass and intercept valve positions were monitored for proper operation. In addition, the main turbine overspeed trip test was performed with the turbine both off-line and on-line during startup. Throughout the startup, the EHC system functioned properly.

As a long term corrective action, EHC system preventive maintenance frequency will be increased to every refuel outage as opposed to the current frequency of every other refuel outage. Additional necessary identified testing will also be incorporated. These actions will be completed prior to the next refueling outage.

V. ADDITIONAL INFORMATION

A. The failed or malfunctioning EHC components are identified in the Corrective Actions section.

B. One previous similar event which resulted in a reactor scram due to EHC system perturbations occurred in 1983. Several other Turbine/ EHC related scrams have occurred throughout plant history, however, the causes for those events were different than the cause of this event.

C. Applicable EIIS System Codes:

1. Reactor Protection System - JD;

2. Containment Isolation Control System - JM;
3. Main Turbine System - TA;
4. Electro-Hydraulic Controls - JI, JJ.

ATTACHMENT 1 TO 9103130120 PAGE 1 OF 1

Iowa Electric Light and Power Company

March 6, 1991
DAEC-91-0159

Mr. A. Bert Davis
Regional Administrator
Region III
U. S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, IL 60137

Subject: Duane Arnold Energy Center
Docket No: 50-331
Op. License DPR-49
Licensee Event Report #91-003

Gentlemen:

In accordance with 10 CFR 50.73 please find attached a copy of the subject Licensee Event Report.

Very truly yours,

David L. Wilson
Plant Superintendent - Nuclear

DLW/RM/pwj

cc: Director of Nuclear Reactor Regulation
Document Control Desk
U. S. Nuclear Regulatory Commission
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NRC Resident Inspector - DAEC

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File A-118a

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